Anchorage Sensitivity Index Decision Support System

ASIDESS User Guide

July 21, 2005

AEROMAP U.S.

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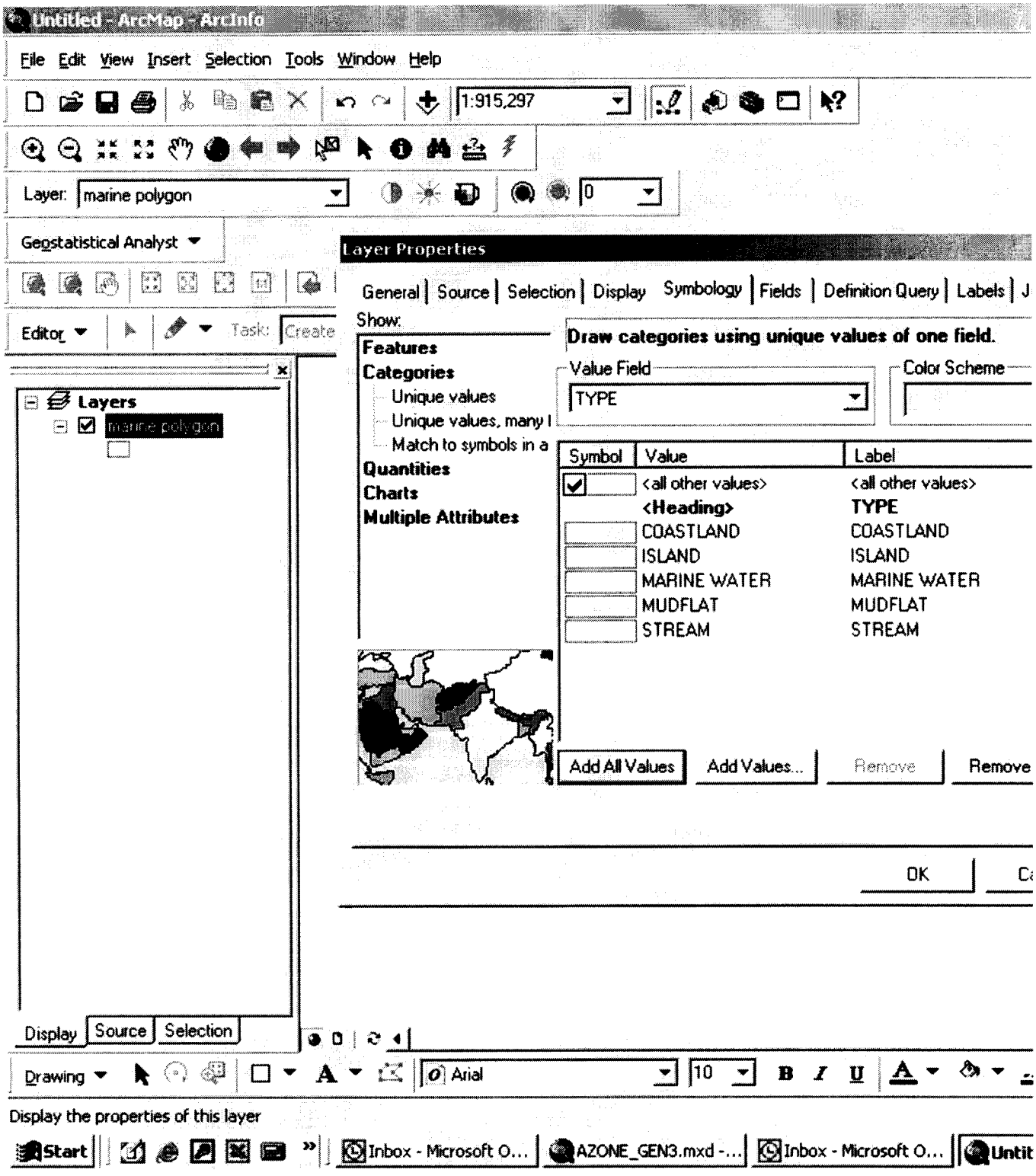
Introduction

The Anchorage Sensitivity Index Decision Support System (ASIDESS) is a Decision Support System (DSS) that enables the user to explore the sensitivity of areas within the Anchorage Bowl to development. The Sensitivity Index score for each pixel is derived from the cumulative results for each of four types of impacts to sensitivity based on 21 datasets. These data sets are grouped into five different topics: Aquatic, Coastal and Public Access, Geotechnical Hazards, Habitat and Human Impacts. Four of these classes contribute to the score. One, Coastal and Public Access, provides contextual information for the model users.

ASIDESS employs a standard weighting and rating methodology to derive the scores for each pixel. Each data set is converted to raster (if not already in raster format) and the resulting pixels are each assigned a value from 0-4 based on their attribute. The user may adjust these rates. These values are combined for each of the four contributing classes. Finally, the Aquatic, Geotechnical Hazards, Habitat and Human Impacts results are normalized and weights are applied based on user preferences. The resulting data set indicates each pixel's sensitivity to development based on the weights and rates used for the model run.

ASIDESS is built in ArcGIS using ModelBuilder and provides a simple interface and a repeatable procedure that allows for data updates and comparisons between different scenarios. The user may update data sets and change the class weights using this primary interface. Changes to the data set rates may be performed through the standard ModelBuilder interface.

ASIDESS consists of seven models and a custom interface. Detailed information about the components comprises the remainder of this document. The following documentation includes a graphic of each model and the Help files created during this project to assist the user with the custom interface and the ModelBuilder models.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MARINE WATER | MARINE WATER
MUDFLAT | MUDFLAT
STREAM | STREAM
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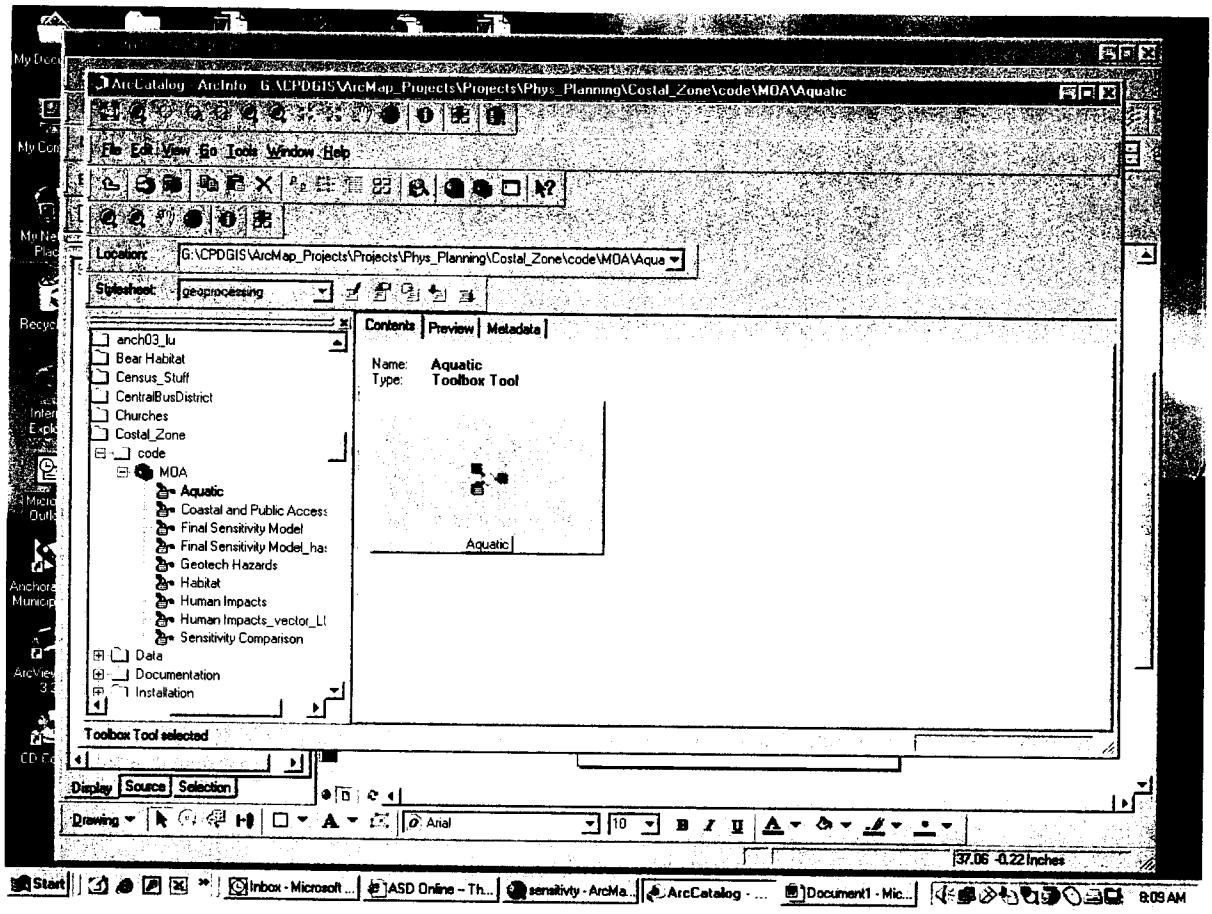
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Aquatic
Coastal and Public Access
Final Sensitivity Model
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Sensitivity Comparison
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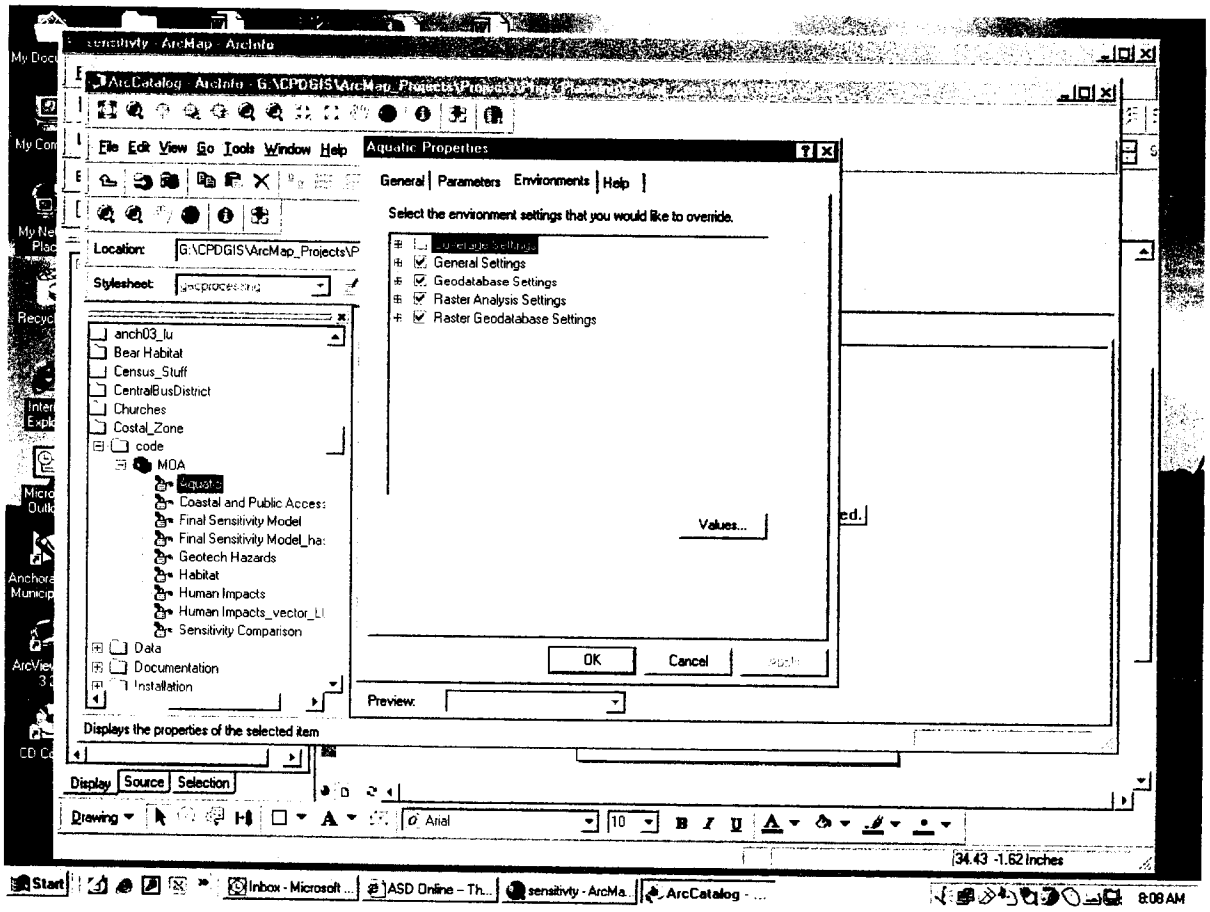
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Aquatic Properties
General | Parameters | Environments | Help
Select the environment settings that you would like to override.
General Settings
Geodatabase Settings
Raster Analysis Settings
Raster Geodatabase Settings
Values...
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Cancel
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Census_Stuff
CentralBusDistrict
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Script Example

▼Model

Elements

Name	Explanation
Normalize Habitat	Mulitplication factor used to normalize the values of each of the topics. This adjusts the values of the final data set for each submodel so that they are on the same scale (0-20) and mitigates the effects of some models requiring more data sets than others. • Habitat = 0.55556
Habitats Weight	Multiplies the normalized Habitat data by the weight assigned by the user. • Default = 30
Normalize Geotech	Mulitplication factor used to normalize the values of each of the topics. This adjusts the values of the final data set for each submodel so that they are on the same scale (0-20) and mitigates the effects of some models requiring more data sets than others. • Geotech = 1
Geotechnical Weight	Multiplies the normalized Geotechnical data by the weight assigned by the user. • Default = 30
Normalize Aquatic Resources	Mulitplication factor used to normalize the values of each of the topics. This adjusts the values of the final data set for each submodel so that they are on the same scale (0-20) and mitigates the effects of some models requiring more data sets than others. • Aquatic Resources = 1
Aquatic Resources Weight	Multiplies the normalized Aquatic Resources data by the weight assigned by the user. • Default = 30

Name	Explanation
Normalize Human Impacts	Mulitplication factor used to normalize the values of each of the topics. This adjusts the values of the final data set for each submodel so that they are on the same scale (0-20) and mitigates the effects of some models requiring more data sets than others. • Human Impacts = 5
Human Impact Weight	Multiplies the normalized Human Impacts data by the weight assigned by the user. • Default = 10
Combine Weighted Inputs	Calculates the sum of the normalized and weighted data from each topic.

Aquatic Model

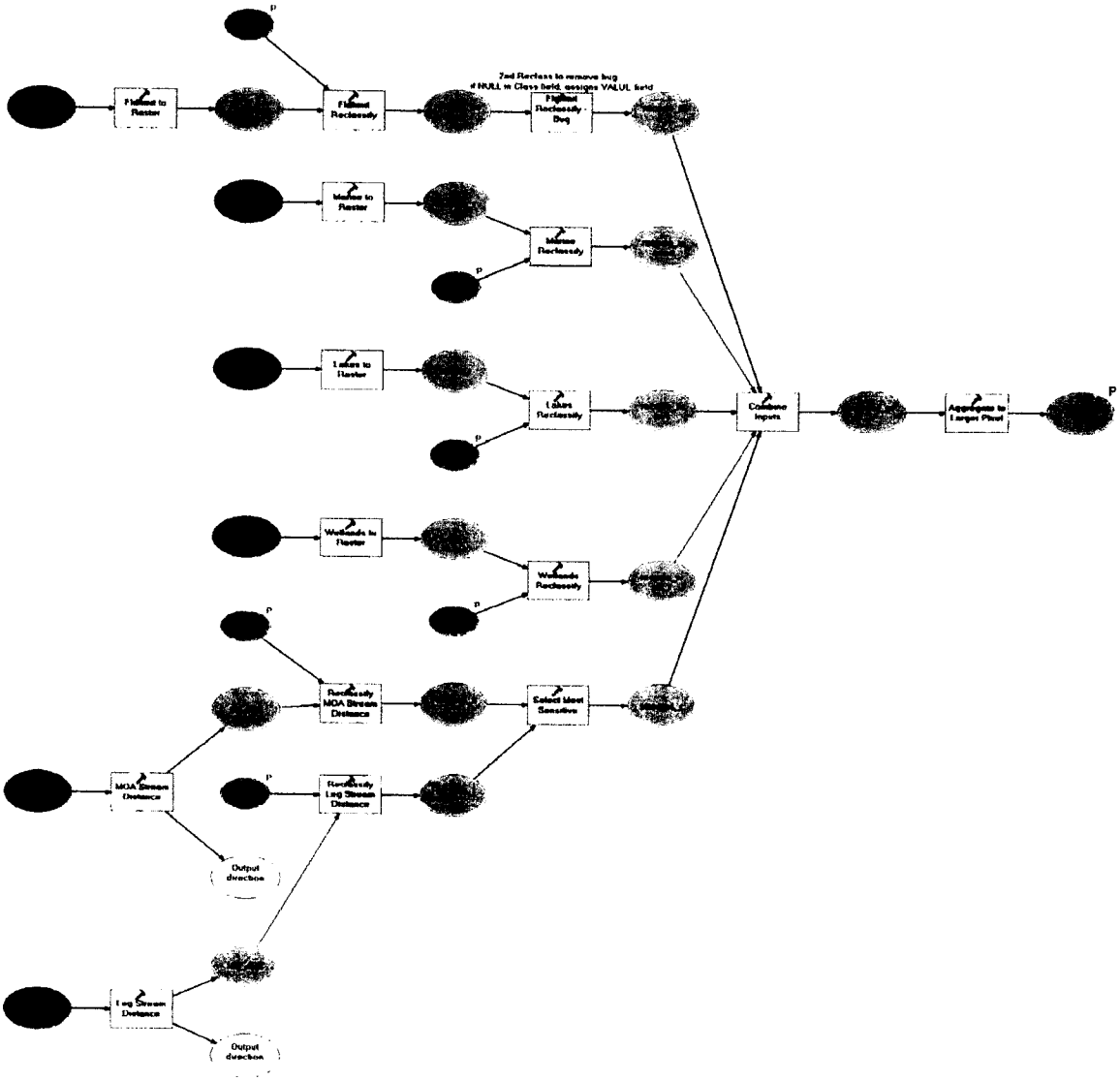

Figure 3: Aquatic Model

Aquatic

collapse all

This tool is one component of the Anchorage Sensitivity Index Decision Support System (ASIDESS). ASIDESS is designed to assist in the assessment of development plans for areas in the Anchorage Bowl with regards to the Coastal Management Plan. Twenty-one different data sets grouped into four topics contribute to the output data set. The four topics are: Aquatic Resources, Habitat, Geotechnical Hazards and Human Impacts. A fifth topic, Coastal and Public Access is also a component of the model, but does not contribute to the output sensitivty data. Rather, it creates a data set that can inform the user as to the accessibility of areas within the coastal zone management area.

The Aquatic Resources model incorporates the streams, lakes, marine areas, wetlands, and flood zones of the Anchorage Bowl into the assessment model.

Each data set is converted to raster and then rated on a scale of 0 - 4 for sensitivity to development. 0 is not sensitive and 4 is most sensitive.

Note: The input data sets do not cover the same areas. Some areas, especially on the eastern edge of the study area, are not well covered. Areas covered by fewer data sets have a lower possible total score.

▼Usage Tips

The use of models enables a repeatable, flexible process that can incorporate updated data or even new data sets. Updates to the data are almost automatic, assuming the revised data set has the same name and is in the same location as the original data set.

If a data set has been updated, run the model to update the final output of the model, Aquatic.

To edit the rates assigned to any data set, open the model, select the reclassification function and change the rates to the desired values.

▼Command line syntax

Aquatic <aquatic> <Fldlimit_Reclassification> <Marine_Reclassification> <Lakes_Reclassification> <Wetlands_Reclassification> <MOA_Streams_Reclassification> <Leg_Streams_Reclassification>

Parameters

Expression	Explanation
<aquatic>	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is Aquatic
<Fldlimit_Reclassification>	Rating values for the Fldlimit data set

Expression	Explanation
<Marine_Reclassification>	Rating values for the Marine data set
<Lakes_Reclassification>	Rating values for the Lakes data set
<Wetlands_Reclassification>	Rating values for the Wetlands data set
<MOA_Streams_Reclassification>	Rating values for the MOA Streams data set
<Leg_Streams_Reclassification>	Rating values for the Leg Streams data set

Command Line Example

▼Scripting syntax

Aquatic (aquatic, Fldlimit_Reclassification, Marine_Reclassification, Lakes_Reclassification, Wetlands_Reclassification, MOA_Streams_Reclassification, Leg_Streams_Reclassification)

Parameters

Expression	Explanation
aquatic (Required)	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is Aquatic
Fldlimit Reclassification (Required)	Rating values for the Fldlimit data set
Marine Reclassification (Required)	Rating values for the Marine data set
Lakes Reclassification (Required)	Rating values for the Lakes data set
Wetlands Reclassification (Required)	Rating values for the Wetlands data set
MOA Streams Reclassification (Required)	Rating values for the MOA Streams data set
Leg Streams Reclassification (Required)	Rating values for the Leg Streams data set

Script Example

▼Model

Elements

Name	Explanation
Leg Stream Distance	Calculates the distance a cell is from a Leg Stream. Cell size is 82.
MOA Stream Distance	Calculates the distance a cell is from an MOA Stream. Cell size is 82.
Marine to Raster	Converts Marine data to raster using the Type field.
Marine Reclassify	Reclassify the Marine Type data to numeric ratings.
Lakes to Raster	Converts Lakes data to raster using the Plot field.
Lakes Reclassify	Reclassify the Lakes Plot data to numeric ratings.
Fldlimit to Raster	Converts Fldlimit data to raster using the Class field.
Fldlimit Reclassify	Reclassify the Floodlimit Class data to numeric ratings.
Fldlimit Reclassify - Bug Workaround	This reclassify is a bug workaround. If a feature does not have a value in the Class field, the value from the Value field is inserted in the Class field. This function corrects this bug for the Fldlimit data only.
Reclassify Leg Stream Distance	Reclassify the Leg Stream distance data to numeric ratings.
Reclassify MOA Stream Distance	Reclassify the MOA Stream distance data to numeric ratings.
Select Most Sensitive	Using the Map Algebra function "Max", selects the most sensitive rating for a cell from the two stream distance data sets. The more sensitive (greater number) of the data sets is output to Streams_r

Name	Explanation
Wetlands to Raster	Converts Wetlands data to raster using the Designation field.
Wetlands Reclassify	Reclassify the Wetlands Designation data to numeric ratings.
Combine Inputs	Uses the Map Algebra "Sum" function to add the values from the input data sets to determine the sensitivity of a cell to development for Aquatic Resources.
Aggregate to Larger Pixel	Aggregates the combined data to 82 foot pixels from 20.5 foot pixels using the Maximum specification.

Coastal and Public Access

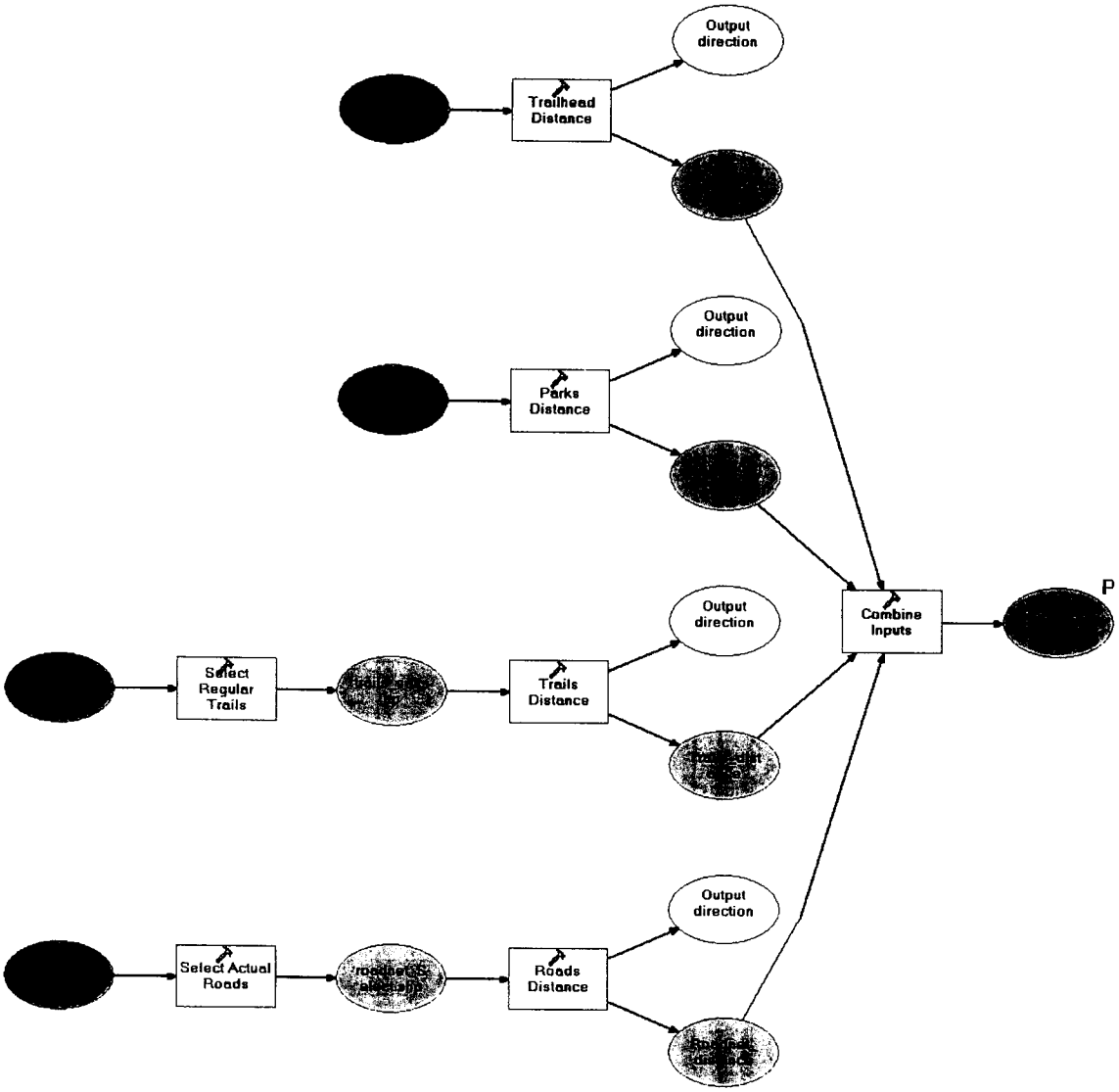

Figure 4: Coastal and Public Access Model

Coastal and Public Access

collapse all

This tool is one component of the Anchorage Sensitivity Index Decision Support System (ASIDESS). ASIDESS is designed to assist in the assessment of development plans for areas in the Anchorage Bowl with regards to the Coastal Management Plan.

Coastal and Public Access is also a component of the model, but does not contribute to the output sensitivty data. Rather, it creates a data set that can inform the user as to the accessibility of areas within the coastal zone management area.

The Coastal and Public Access model calculates the distance cells are from Roads, Parks, Trails and Trailheads.

▼Usage Tips

The use of models enables a repeatable, flexible process that can incorporate updated data or even new data sets. Updates to the data are almost automatic, assuming the revised data set has the same name and is in the same location as the original data set.

If a data set has been updated, run the model to update the final output of the model, Coastal and Public Access.

▼Command line syntax

Coastal and Public Access <Coast_access>

Parameters

Expression	Explanation
<Coast_access>	Name of the file to be output. • Default is Coast_access.

Command Line Example

▼Scripting syntax

Coastal and Public Access (Coast_access)

Parameters

Expression	Explanation
Coast_access (Required)	Name of the file to be output.

Expression	Explanation
	• Default is Coast_access.

Script Example

▼Model

Elements

Name	Explanation
Parks Distance	Calculates the distance a cell is from a Park. Cell size is 82.
Select Regular Trails	
Trails Distance	Calculates the distance a cell is from a Trail. Cell size is 82.
Select Actual Roads	
Roads Distance	Calculates the distance a cell is from an Road. Cell size is 82.
Trailhead Distance	Calculates the distance a cell is from a Trailhead. Cell size is 82.
Combine Inputs	Uses the Map Algebra "Min" function determine the minimum distance a cell is from a Trailhead, Park, Trail, or Raod.

Geotechnical Hazards

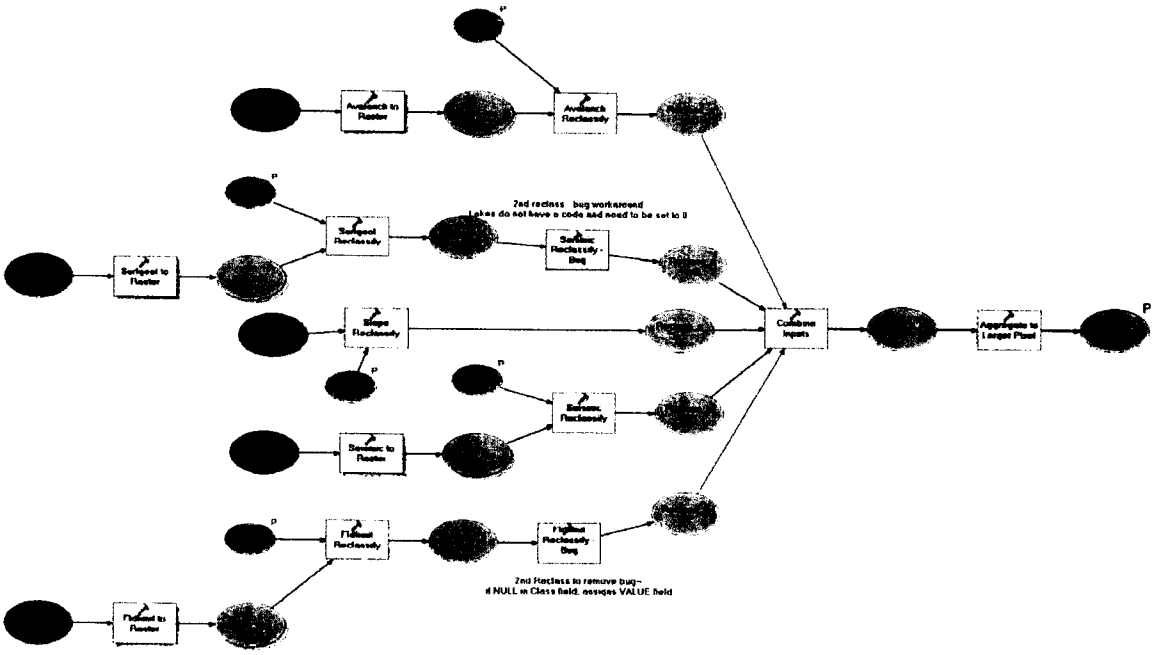

Figure 5: Geotechnical Hazards Model

Geotech Hazards

collapse all

This tool is one component of the Anchorage Sensitivity Index Decision Support System (ASIDESS). ASIDESS is designed to assist in the assessment of development plans for areas in the Anchorage Bowl with regards to the Coastal Management Plan.

The Geotech Hazards model incorporates avalanche, surficial geology, seismic data, and flood zones of the Anchorage Bowl into the assessment model.

Each data set is converted to raster and then rated on a scale of 0 - 4 for sensitivity to development. 0 is not sensitive and 4 is most sensitive.

Note: The input data sets do not cover the same areas. Some areas, especially on the eastern edge of the study area, are not well covered. Areas covered by fewer data sets have a lower possible total score.

▼Usage Tips

The use of models enables a repeatable, flexible process that can incorporate updated data or even new data sets. Updates to the data are almost automatic, assuming the revised data set has the same name and is in the same location as the original data set.

If a data set has been updated, run the model to update the final output of the model, Geotech.

To edit the rates assigned to any data set, open the model, select the reclassification function and change the rates to the desired values.

▼Command line syntax

Geotech Hazards <Avalanch_Reclassification> <Surfgeol_Reclassification> <Seismic_Reclassification> <Fldlimit_Reclassification> <Slope_Reclassification> <geotech>

Parameters

Expression	Explanation
<Avalanch_Reclassification>	Rating values for the Avalanch data set
<Surfgeol_Reclassification>	Rating values for the Surfgeol data set
<Seismic_Reclassification>	Rating values for the Seismic data set
<Fldlimit_Reclassification>	Rating values for the Fldlimit data set

Expression	Explanation
<Slope_Reclassification>	Rating values for the Slope data set
<geotech>	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is Geotech

Command Line Example

▼Scripting syntax

Geotech Hazards (Avalanch_Reclassification, Surfgeol_Reclassification, Seismic_Reclassification, Fldlimit_Reclassification, Slope_Reclassification, geotech)

Parameters

Expression	Explanation
Avalanch Reclassification (Required)	Rating values for the Avalanch data set
Surfgeol Reclassification (Required)	Rating values for the Surfgeol data set
Seismic Reclassification (Required)	Rating values for the Seismic data set
Fldlimit Reclassification (Required)	Rating values for the Fldlimit data set
Slope Reclassification (Required)	Rating values for the Slope data set
geotech (Required)	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is Geotech

▼Model

Elements

Name	Explanation

Name	Explanation
Avalanch to Raster	Converts Avanch data to raster using the AVCODE field.
Avalanch Reclassify	Reclassify the Avalanch VALUE data to numeric ratings.
Seismic to Raster	Converts Seismic data to raster using the CODE field.
Seismic Reclassify	Reclassify the Seismic CODE data to numeric ratings.
Surfgeol to Raster	Converts Surfgeol data to raster using the UNIT_ABBV field.
Surfgeol Reclassify	Reclassify the Surfgeol UNIT_ABBV data to numeric ratings.
Seismic Reclassify - Bug	This reclassify is a bug workaround. If a feature does not have a value in the UNIT_ABBV field, the value from the Value field is inserted in the UNIT_ABBV field. This function corrects this bug for the Seismic data only.
Fldlimit to Raster	Converts Fldlimit data to raster using the Class field.
Fldlimit Reclassify	Reclassify the Floodlimit Class data to numeric ratings.
Fldlimit Reclassify - Bug Workaround	This reclassify is a bug workaround. If a feature does not have a value in the Class field, the value from the Value field is inserted in the Class field. This function corrects this bug for the Fldlimit data only.
Slope Reclassify	
Combine Inputs	Uses the Map Algebra "Sum" function to add the values from the input data sets to determine the sensitivity of a cell to development for Geotechnical Hazards.
Aggregate to Larger Pixel	Aggregates the combined data to 82 foot pixels from 20.5 foot pixels using the Maximum specification.

Habitat

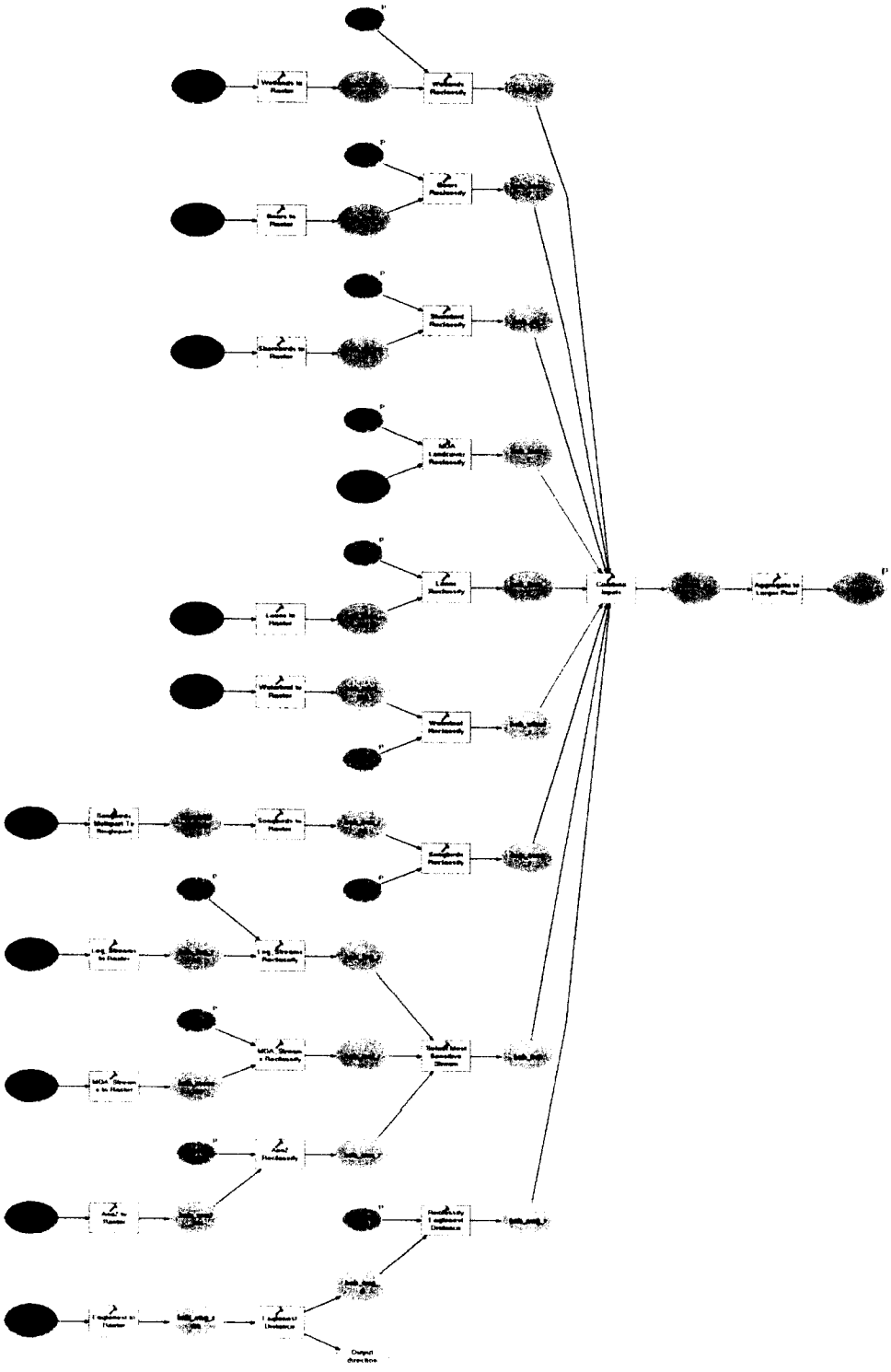

Figure 6: Habitat Model

Habitat

collapse all

This tool is one component of the Anchorage Sensitivity Index Decision Support System (ASIDESS). ASIDESS is designed to assist in the assessment of development plans for areas in the Anchorage Bowl with regards to the Coastal Management Plan.

The Habitat model incorporates habitat data for bears, shorebirds, loons, waterfowl, songbirds, known eagle nests, wetlands, landcover, and fish habitat data for the Anchorage Bowl into the assessment model.

Each data set is converted to raster and then rated on a scale of 0 - 4 for sensitivity to development. 0 is not sensitive and 4 is most sensitive.

Note: The input data sets do not cover the same areas. Some areas, especially on the eastern edge of the study area, are not well covered. Areas covered by fewer data sets have a lower possible total score.

▼Usage Tips

The use of models enables a repeatable, flexible process that can incorporate updated data or even new data sets. Updates to the data are almost automatic, assuming the revised data set has the same name and is in the same location as the original data set.

If a data set has been updated, run the model to update the final output of the model, Habitat

To edit the rates assigned to any data set, open the model, select the reclassification function and change the rates to the desired values.

▼Command line syntax

Habitat <MOA_Landcover_Reclassification> <Wetlands_Reclassification> <Bears_Reclassification> <Waterfowl_Reclassification> <Loons_Reclassification> <Shorebird_Reclassification> <Eaglenest_Dist__Reclassification> <Leg_Streams_Reclassification> <MOA_Streams_Reclassification> <Ana2_Reclassification> <Songbirds_Reclassification> <Habitat>

Parameters

Expression	Explanation
<MOA_Landcover_Reclassification>	Rating values for the MOALandcover data set
<Wetlands_Reclassification>	Rating values for the E03MWetlands data set
<Bears_Reclassification>	Rating values for the Bears data set
<Waterfowl_Reclassification>	Rating values for the Watfowl data set

Expression	Explanation
<Loons_Reclassification>	Rating values for the Loonnest data set
<Shorebird_Reclassification>	Rating values for the Shbird data set
<Eaglenest_Dist__Reclassification>	Rating values for the Eaglenst data set
<Leg_Streams_Reclassification>	Rating values for the Leg_Streams data set
<MOA_Streams_Reclassification>	Rating values for the MOA_Streams data set
<Ana2_Reclassification>	Rating values for the Ana2 data set
<Songbirds_Reclassification>	Rating values for the Songbird data set
<Habitat>	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is Habitat

Command Line Example

▼Scripting syntax

Habitat (MOA_Landcover_Reclassification, Wetlands_Reclassification, Bears_Reclassification, Waterfowl_Reclassification, Loons_Reclassification, Shorebird_Reclassification, Eaglenest_Dist__Reclassification, Leg_Streams_Reclassification, MOA_Streams_Reclassification, Ana2_Reclassification, Songbirds_Reclassification, Habitat)

Parameters

Expression	Explanation
MOA Landcover Reclassification (Required)	Rating values for the MOALandcover data set
Wetlands Reclassification (Required)	Rating values for the E03MWetlands data set
Bears Reclassification (Required)	Rating values for the Bears data set

Expression	Explanation
Waterfowl Reclassification (Required)	Rating values for the Watfowl data set
Loons Reclassification (Required)	Rating values for the Loonnest data set
Shorebird Reclassification (Required)	Rating values for the Shbird data set
Eaglenest Dist. Reclassification (Required)	Rating values for the Eaglenst data set
Leg_Streams Reclassification (Required)	Rating values for the Leg_Streams data set
MOA_Streams Reclassification (Required)	Rating values for the MOA_Streams data set
Ana2 Reclassification (Required)	Rating values for the Ana2 data set
Songbirds Reclassification (Required)	Rating values for the Songbird data set
Habitat (Required)	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is Habitat

Script Example

▼Model

Elements

Name	Explanation
Eaglenest to Raster	Converts Eaglenest data to raster by indicating each 20.5 ft cell an eaglesnest falls into.
Eaglenest Distance	
Reclassify Eaglenest Distance	Reclassify the Eaglenest distance data to numeric ratings.
Wetlands to Raster	Converts Wetlands data to raster using the Designation

Name	Explanation
	field.
Wetlands Reclassify	Reclassify the Wetlands Designation data to numeric ratings.
Leg_Streams to Raster	Converts Leg_Streams data to raster by indicating each 20.5 ft cell a stream falls into.
Leg_Streams Reclassify	Reclassify the Leg_Streams data to numeric ratings.
MOA_Streams to Raster	Converts MOA_Streams data to raster by indicating each 20.5 ft cell a stream falls into.
MOA_Streams Reclassify	Reclassify the MOA_Streams data to numeric ratings.
Ana2 to Raster	Converts Ana2 data to raster by indicating each 20.5 ft cell a stream falls into.
Ana2 Reclassify	Reclassify the Ana2 (Anadramous Fish) streams data to numeric ratings.
Select Most Sensitive Stream	
Bears to Raster	Converts Bears data to raster using the ORIG_DATA field.
Bears Reclassify	Reclassify the Bears ORIG_DATA data to numeric ratings.
Shorebirds to Raster	Converts Shorebirds data to raster using the MIGRATION field.
Shorebird Reclassify	Reclassify the Shorebird MIGRATION data to numeric ratings.
Loons to Raster	Converts Loons data to raster.

Name	Explanation
Loons Reclassify	Reclassify the Loons data to numeric ratings.
Waterfowl to Raster	Converts Waterfowl data to raster using the WINTER field.
Waterfowl Reclassify	Reclassify the Waterfowl WINTER data to numeric ratings.
Songbirds Multipart To Singlepart	
Songbirds to Raster	Converts Songbirds data to raster using the NUMBER field.
Songbirds Reclassify	Reclassify the Songbirds data to numeric ratings.
MOA Landcover Reclassify	Reclassify the MOA Landcover CALC_CLASS data to numeric ratings.
Combine Inputs	Uses the Map Algebra "Sum" function to add the values from the input data sets to determine the sensitivity of a cell to development for Habitat.
Aggregate to Larger Pixel	Aggregates the combined data to 82 foot pixels from 20.5 foot pixels using the Maximum specification.

Human Impacts

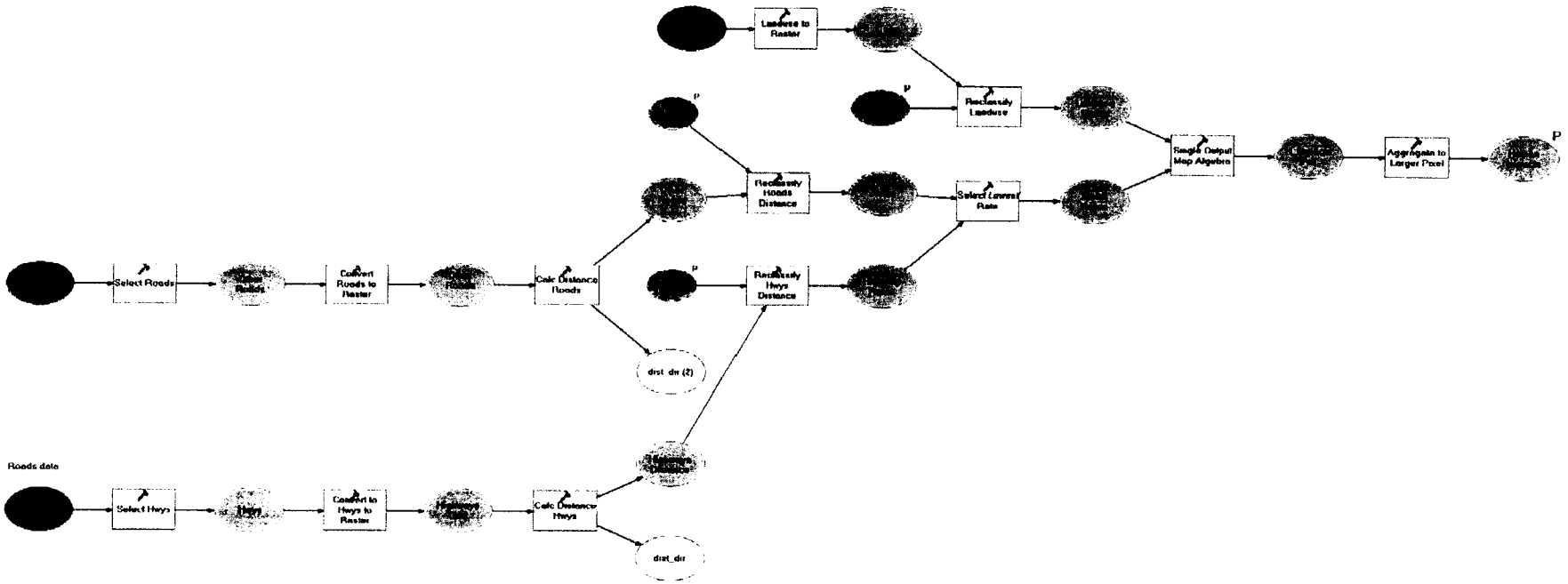

Figure 7: Human Impacts Model

Human Impacts

collapse all

This tool is one component of the Anchorage Sensitivity Index Decision Support System (ASIDESS). ASIDESS is designed to assist in the assessment of development plans for areas in the Anchorage Bowl with regards to the Coastal Management Plan.

The Human Impacts model includes Roads and Land Use data. It assesses the effects of existing Roads and Land Use codes on the current sensitivity of an area to development.

Each data set is converted to raster and then rated on a scale of 0 - 4 for sensitivity to development. 0 is not sensitive and 4 is most sensitive.

▼Usage Tips

The use of models enables a repeatable, flexible process that can incorporate updated data or even new data sets. Updates to the data are almost automatic, assuming the revised data set has the same name and is in the same location as the original data set.

If a data set has been updated, run the model to update the final output of the model, H_impact_g.

To edit the rates assigned to any data set, open the model, select the reclassification function and change the rates to the desired values.

WARNING: The Land Use data takes exceptionally long to translate to raster.

▼Command line syntax

Human Impacts2 <Land_Use_Reclassification> <Road_Distance_Reclassification> <Hwy_Distance_Reclassification> <Human_Impacts>

Parameters

Expression	Explanation
<Land_Use_Reclassification>	Rating values for the Landuse data set
<Road_Distance_Reclassification>	Rating values for the Road_dist data set
<Hwy_Distance_Reclassification>	Rating values for the Hwy_dist data set
<Human_Impacts>	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is H_impact_g

▼Scripting syntax

Human Impacts2 (Land_Use_Reclassification, Road_Distance_Reclassification, Hwy_Distance_Reclassification, Human_Impacts)

Parameters

Expression	Explanation
Land Use Reclassification (Required)	Rating values for the Landuse data set
Road Distance Reclassification (Required)	Rating values for the Road_dist data set
Hwy Distance Reclassification (Required)	Rating values for the Hwy_dist data set
Human Impacts (Required)	Name of the file to be output. If this is changed, it might not be read by the Final Sensitivity Model. • Default is H_impact_g

▼Model

Elements

Name	Explanation
Select Hwys	Selects only the Highways (CFCC=A10) from the Roadnet data.
Convert to Hwys to Raster	Translates the non-highway (CFCC<>A10) Roadnet data to raster format.
Calc Distance Hwys	Calculates the distance of each cell from a Highway.
Select Roads	Selects roads that are NOT highways from the Roadnet data.
Convert Roads to Raster	Translates the non-highway (CFCC<>A10) Roadnet data to raster format.
Calc Distance Roads	Calculates the distance of each cell from a Road

Sensitivity Comparison

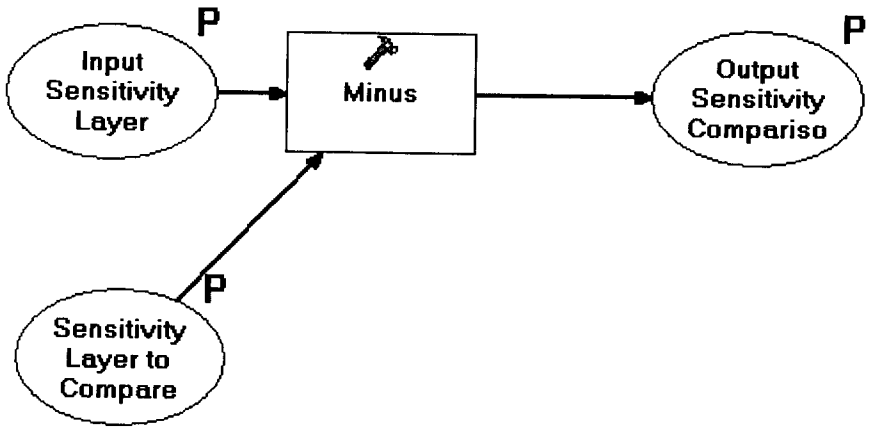

Figure 8: Sensitivity Comparison Model

Sensitivity Comparison

collapse all

Compares the outputs of two selected model runs to indicate where there are differences and the magnitude of those differences.

Once the model has been run twice with different weights (or rates), the outputs can be compared if they have different names.

▼Usage Tips

Use this tool to determine if changes made to the weights (or rates) make significant differences in the output.

▼Command line syntax

Sensitivity Comparison <Input_Sensitivity_Layer> <Sensitivity_Layer_to_Compare> <Output_Sensitivity_Comparison>

Parameters

Expression	Explanation
<Input_Sensitivity_Layer>	One of the two data sets to be compared.
<Sensitivity_Layer_to_Compare>	One of the two data sets to be compared.
<Output_Sensitivity_Comparison>	Name of the output data set.

Command Line Example

▼Scripting syntax

Sensitivity Comparison (Input_Sensitivity_Layer, Sensitivity_Layer_to_Compare, Output_Sensitivity_Comparison)

Parameters

Expression	Explanation
Input Sensitivity Layer (Required)	One of the two data sets to be compared.
Sensitivity Layer to Compare (Required)	One of the two data sets to be compared.
Output Sensitivity Comparison (Required)	Name of the output data set.